

# Fitness and Physical Activity in Children with Haemophilia



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# Background

- Physical activity previously discouraged due to risk of bleeding
- Children with haemophilia have reduced aerobic fitness and muscle strength compared with their healthy peers  
(Koch et al 1984, Falk et al 2000)
- Resistance training may improve strength and reduce number of haemarthroses  
(Tiktinsky et al 2002)

# Why Exercise?



# Prevention of Obesity

- 19 to 23% of Australian children and adolescents are obese (Booth et al 2001)
- Obesity in adolescence is associated with increased risk of mortality from all causes independent of adult weight (Must et al NEJM 1992)
- Treatment studies disappointing

# Bone Mineral Accrual

- Weight-bearing exercise in the pre-adolescent years is important for bone mineral accrual
- Greatest effect when weight-bearing exercise is performed in the early pubertal years - Tanner stage 2 and 3  
(McKelvie et al 2001)



# Insulin Sensitivity / Lipid Profile

- The incidence of Type 2 diabetes in children and adolescents is increasing  
(Pinhas-Hamiel et al 1996)
- Aerobic exercise → ↑ insulin sensitivity, ↑ HDL and ↓ LDL
- Potential ↓ life expectancy  
(Olshansky et al NEJM 2005)

# Well-Being / Quality of Life

- Evidence for improved QoL in sub-populations of children
- Little evidence in healthy populations



# Why should children with haemophilia exercise?

- Improve fitness
- Reduce obesity
- Bone health
- ? Reduce bleeding episodes into joints / reduce joint deterioration
- ? Improve quality of life

# The Evidence to Date

# Aerobic Fitness

- ↓ aerobic fitness in 11 boys with haemophilia  
(Koch et al 1984)
- No significant difference in aerobic capacity in 13 boys with severe haemophilia A on prophylaxis  
(Van der net et al 2006)

# Muscle Strength

- Isokinetic strength at the elbow and knee reduced in children with haemophilia

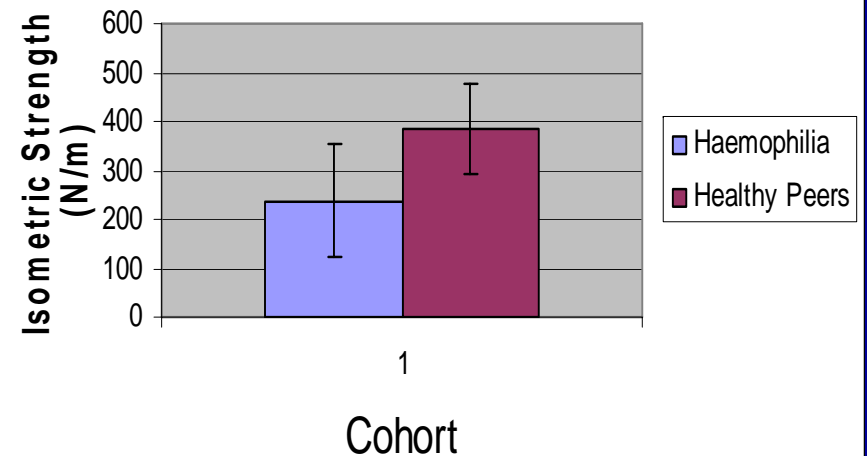
(Falk et al 2000, Falk et al 2005)



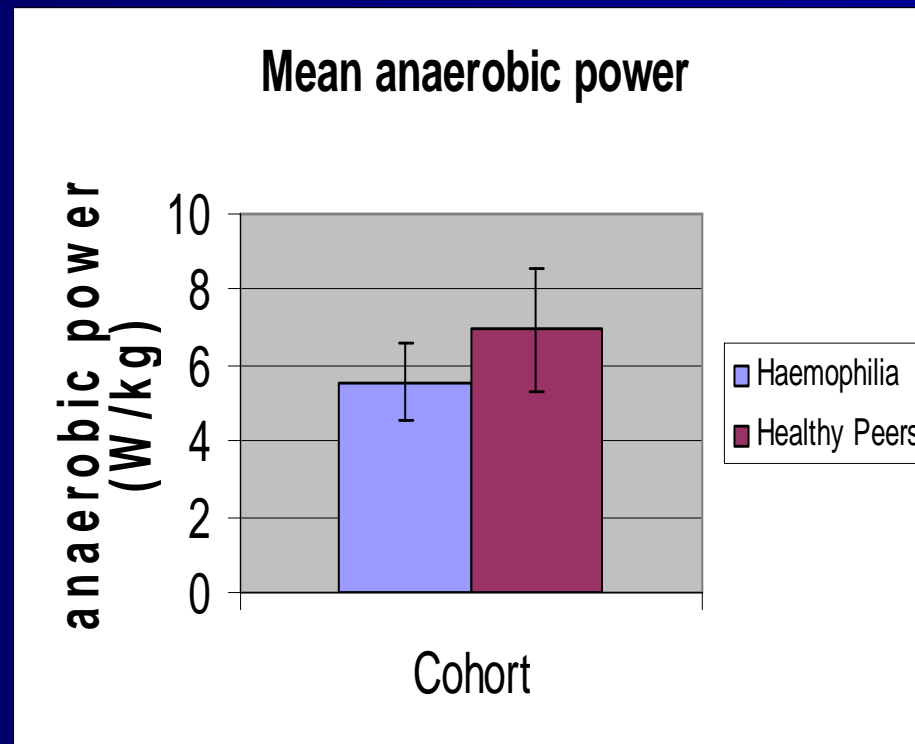
# Muscle Strength

- Isometric quadriceps strength 32-38% less in adults with haemophilia (Hilberg et al 2001)

Isometric Knee Extensor Strength



# Anaerobic Fitness



Falk et al., *Med Sci Sports Exerc* 2000, 32(1):52-57

# Bone Health

- 19 children with severe haemophilia  
↓ areal BMD lumbar spine (-0.92SD)  
(Barnes et al 2004)
- No difference in bone properties in children with haemophilia compared with controls  
(Falk et al 2005)

# CHW Fitness Study

43 boys with haemophilia

Shuttle run

Basketball throw

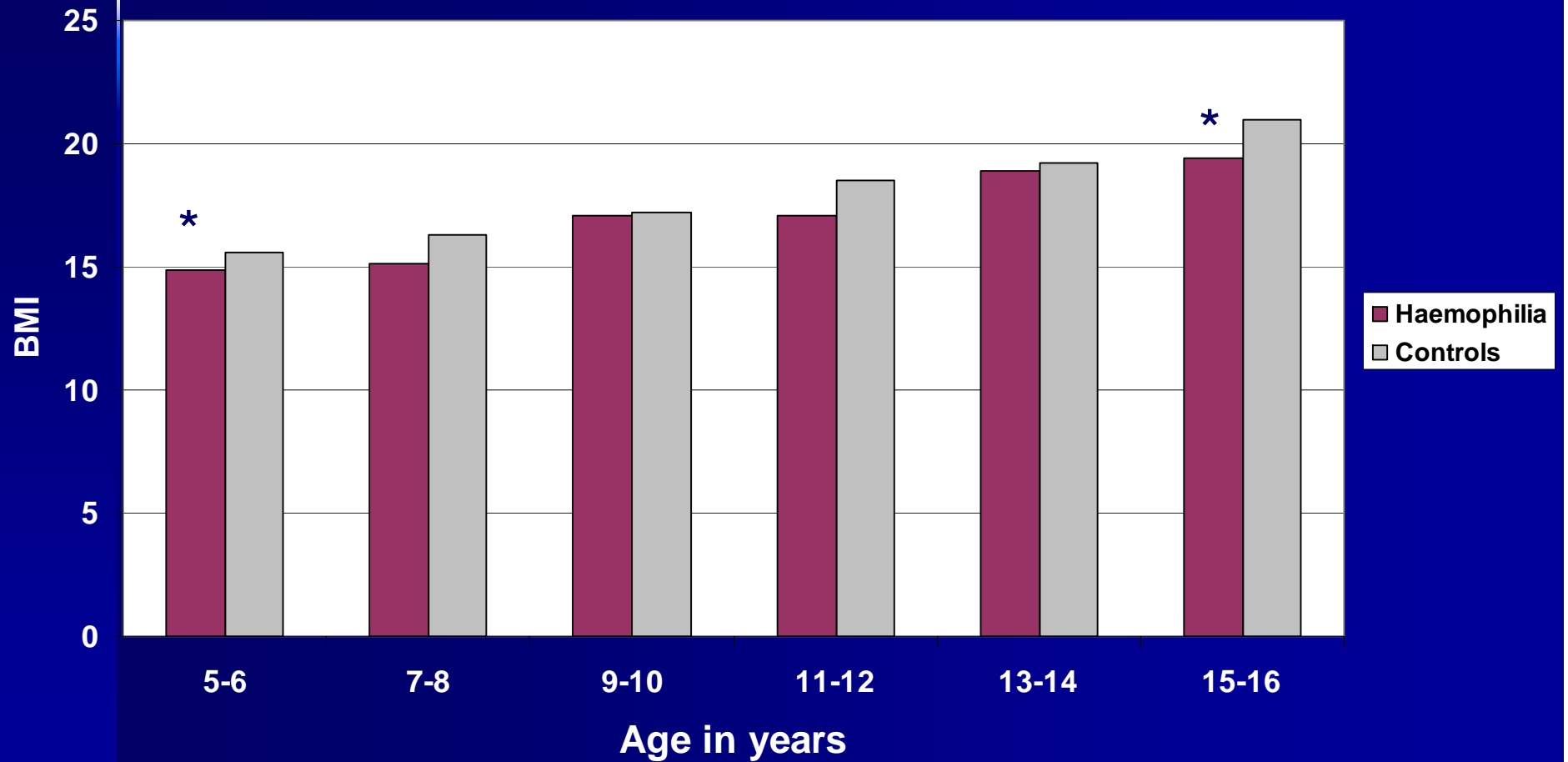
Physical activity  
questionnaire

Compare with 2760  
healthy boys from  
NSW Schools  
Fitness Survey

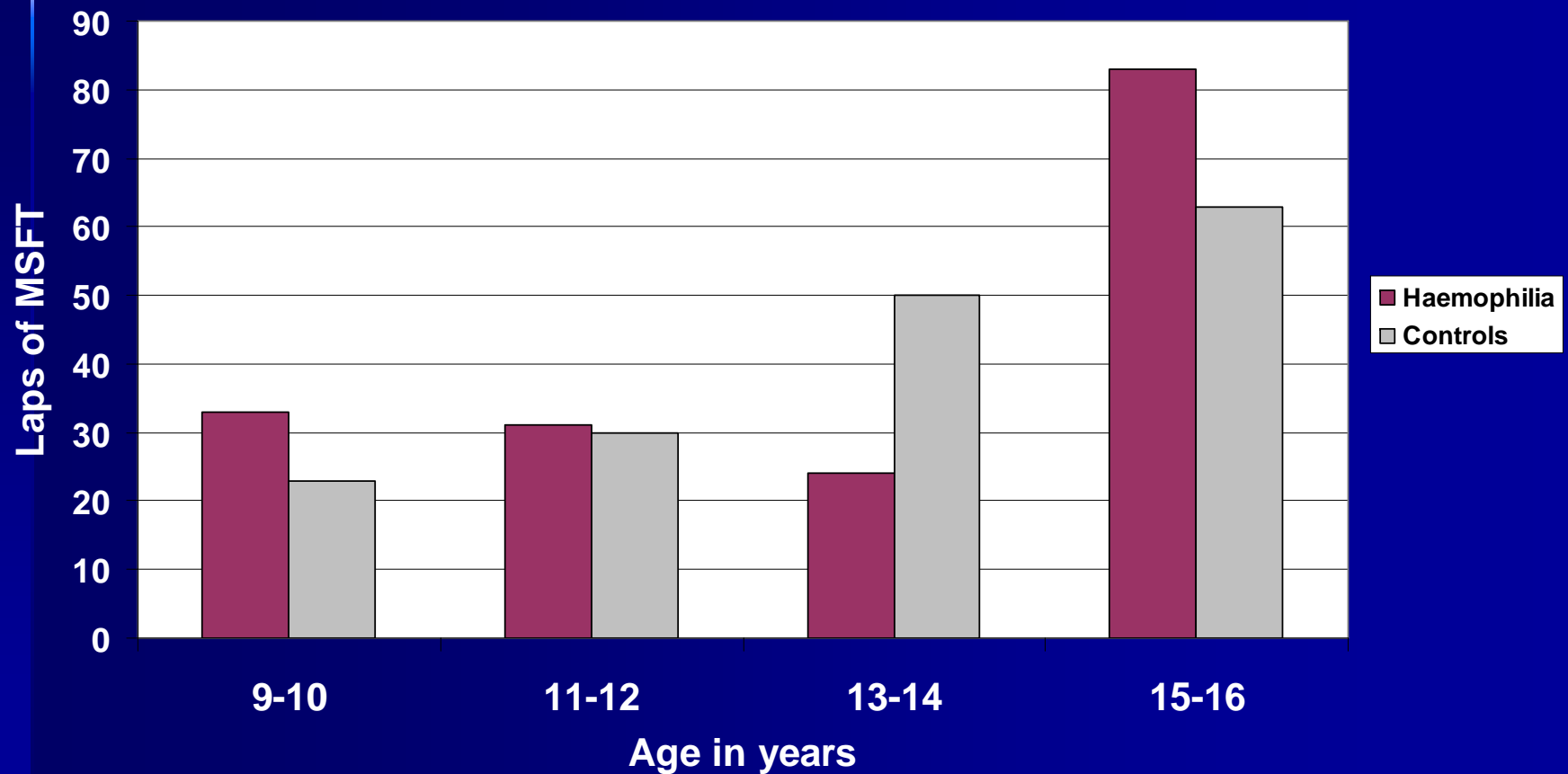
# CHW Participants

- Age 6 - 16 years
- 83% Haemophilia A  
10% Haemophilia B  
7% vWB disorder
- 63% severe
- 83% prophylaxis

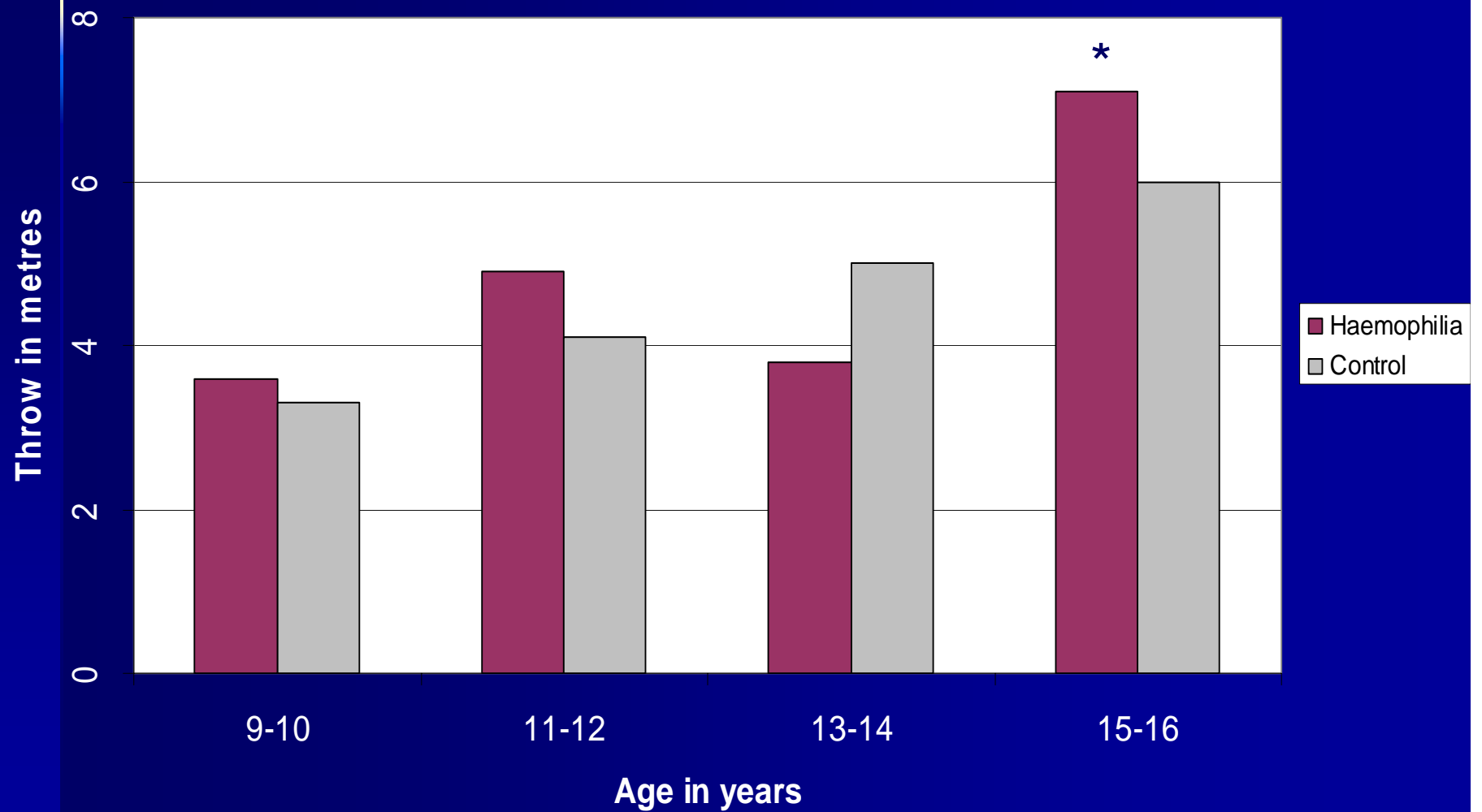
# Results - BMI



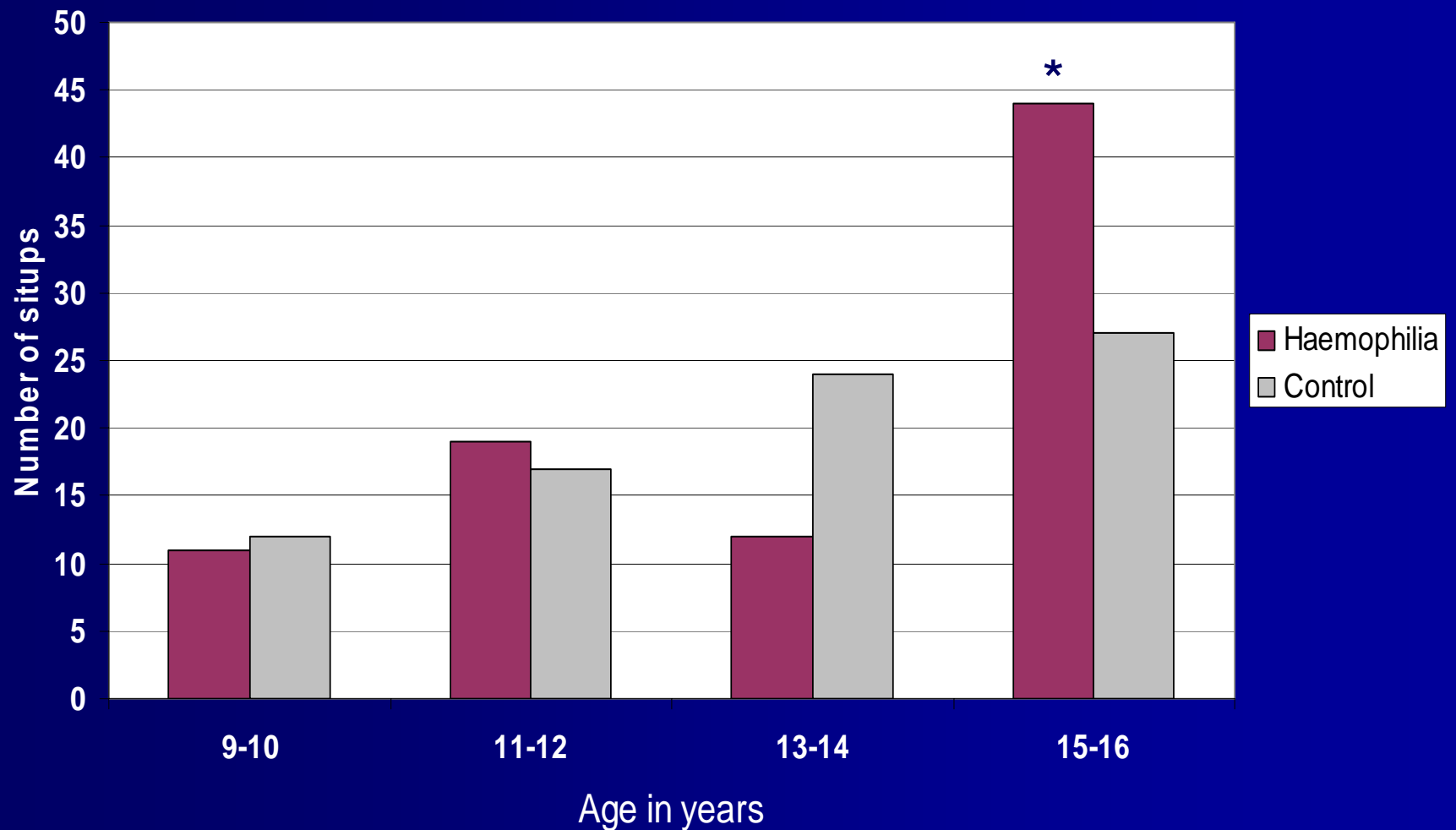
# Results - Aerobic Fitness



# Results - Strength



# Results - Endurance Strength



# Intervention Studies

- ↑ strength & proprioception with exercise intervention (n=9 adults)  
(Hilberg et al 2003)
- ↑ muscle strength and ↓ bleeding tendency in 32 adults and children following a 6 month resistance training program  
(Greene & Strickler 1983)

# Quality of Life

- No previous studies in children with haemophilia
- Evidence from other populations of children with chronic disease  
eg. Asthma, cystic fibrosis

# Exercise & Joint Health

- Rationale for aerobic and resistance training
  - Muscle strengthening and proprioceptive training may act to stabilise joints
  - Submaximal exercise → transient ↑ in coagulation parameters in individuals with & without haemophilia

# Exercise & Joint Health - the research to date

- ↓ frequency & severity of bleeding episodes with resistance training  
(Tiktinsky et al 2002)
- ↑ overall joint ROM in adults who exercised 3 x week compared with those who did not  
(Harris & Boggio 2006)

# CHW Intervention Study

- To determine the effect of exercise on QoL, aerobic fitness & strength in children with haemophilia

70 children with haemophilia

Initial assessment  
& baseline measures of strength, VO<sub>2</sub> peak,  
habitual activity & Quality of Life

Participants randomised

Usual medical care:  
Education  
Reassurance  
Treatment of bleeds

Exercise + usual medical  
care :  
2 x 1hr x session/week  
12 weeks  
Resistance and aerobic

Remeasure at 3 months

Remeasure at 3 months

# Primary Outcomes

ID: \_\_\_\_\_  
Date: \_\_\_\_\_

## CHO-KLAT

Canadian Hemophilia Outcomes  
- Kids' Life Assessment Tool



HAEMO-QOL

# Primary Outcomes (cont.)



Isokinetic Strength



$\text{VO}_2$  peak

# Intervention



# Intervention (cont)



# Eligible Participants

- Aged 6-18 years
- Mild, moderate or severe haemophilia A or B or Von Willebrand disorder
- Excluded if
  - Contra-indication to aerobic or resistance training
  - Involved in sport > 3 sessions/week
  - Presence of inhibitors

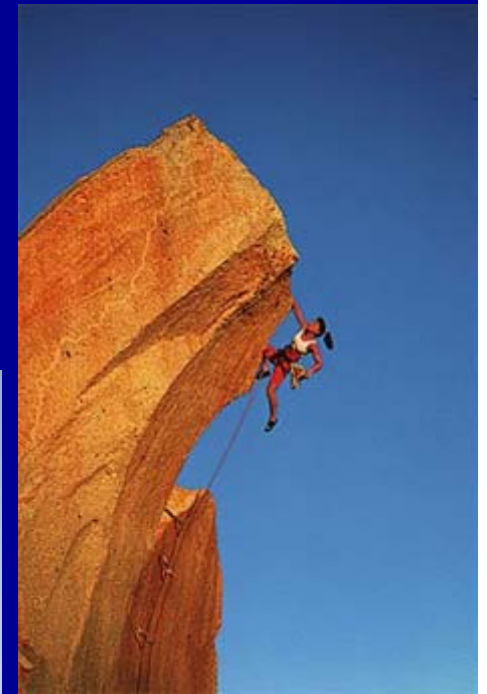
# Triggers for Bleeding in Children with Haemophilia

- 84 boys with moderate or severe haemophilia from CHW & RCH
- Followed for one year
- Report bleeding episodes and specific activities occurring in a case and control period

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(CHW, USyd, RCH)*

# Future Directions

- Estimate transient risk of bleeding associated with various sporting activities



# Summary

- Evidence for the role of exercise in healthy paediatric populations
- May be of additional benefit in children with haemophilia (? ↑ BMD & ↓ bleeding episodes)
- Exercise prescription should become part of routine management

# chiasm

the children's hospital at Westmead

Institute of Sports Medicine

